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**GROWTH AND VOLATILITY IN  
TRANSITION COUNTRIES:  
THE ROLE OF CREDIT**

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Growth and volatility  
in transition countries:  
The role of credit

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*Abstract*

*In this paper we explore whether credit markets may help to explain both the unsatisfactory growth performance and higher volatility of countries in Central-Eastern Europe in the process of entering the European Union (CEECs). The paper provides some evidence on the under-development of credit markets in CEECs. It is found that the development of credit markets plays a significant role in affecting both growth and volatility. It is shown that progress in credit market development, through the convergence of the depth and efficiency of credit markets towards the level prevailing in advanced market economies could have a major impact on growth and would sharply reduce output volatility in CEECs. The paper concludes that a rapid entry in the Eurozone could be the mechanism to ensure a much faster development of financial markets in CEECs.*

## 1. Introduction

Eight countries of Central-Eastern Europe, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic and Slovenia, will join the European Union in May 2004, and two, Bulgaria and Romania, are expected to join in 2007. This is an extraordinary event, if one considers that little more than ten years ago these countries (CEECs from now on) were part of the Soviet bloc and were characterized by a centrally planned economy. Accession to the EU served as a fundamental anchor for reforms in CEECs and, relatively to the transition countries of the Former Soviet Union, it paid off in terms of output growth and macroeconomic stability.

However, such a positive evaluation should be qualified. On the basis of parameters of standard growth regressions one should have expected that over a period of more than a decade, CEECs would have partially closed the wide gap between their incomes per capita and those of European Union countries. In fact, the first 14 years of reforms did not bring any convergence, as, relative to the EU income levels, incomes per capita of CEECs in 2002 were lower than in 1989. This does not necessarily mean that welfare has not increased, as opening up of the economy and the creation of a market economy has likely produced a significant increase in welfare. Nevertheless, growth performance, even in the more successful transition countries, namely the CEECs, has been less than satisfactory. In addition, volatility of growth rates has also remained much higher than that of EU countries, even if one excludes the impact of the initial sharp fall in output during the period 1990-92. This much higher volatility of output growth is somehow puzzling if one considers that CEECs are tightly integrated through trade and FDI's with EU economies. Such integration applies not only to inter-industry but also to intra-industry trade. Trade and industrial production are highly diversified in CEECs and tightly linked with the production process in the EU. This has indeed created a close correlation between the cyclical movements of industrial output in CEECs and the EU, but the amplitude of such movements remains much larger in CEECs.

In this paper we explore whether credit markets may help to explain both the unsatisfactory growth performance and higher volatility of CEECs. Although the empirical analysis focuses on the second phase of transition, we discuss as well the initial output collapse. Indeed, the experience of transition countries may provide general insights on the relationship between credit markets, and of the institutions necessary for their functioning, and macroeconomic outcomes. The role of credit and financial markets in the transition process was emphasized by Calvo and Coricelli (1992, 1993). They argued that the initial collapse in output could be interpreted as a trade implosion due to the sudden dry-up of financing for firms induced by the initial liberalization and stabilization programs. The regression analysis focuses on quarterly data for CEECs over a ten-year period. Compared with previous studies (see the review in Campos and Coricelli (2002)), the narrower set of countries included in the analysis, and the use of quarterly data help to isolate the role of credit and its impact on both output growth and its volatility.

The paper is structured as follows. Section 2 contains some stylized facts on growth, output volatility and progress in reforms. Section 3 reviews the channels through which credit markets could affect output growth and volatility during the whole transition process. Here we reconsider the work by Calvo and Coricelli (1992, 1993, 1996), that focused on the initial phases of transition, in the light of the experience of the more recent years of output recovery in CEECs. This may be useful because it has been observed that volatility in emerging markets is characterized more by crisis-volatility, namely by episodes of sharp decline in output, rather than regular fluctuations around a trend (Hnatkovska and Loayza (2003)).

For CEECs the initial collapse in output represents the main crisis they went through and the under-development of financial sectors was extreme at that stage. It is thus an example of how under-developed financial markets can induce an output collapse. In the same section we also discuss the adjustment of the economy after the initial shock and emphasize that the way financial markets developed in CEECs may explain the presence of barriers to faster growth and, at the same time, higher volatility of output. The under-development of banking sector and stock markets was partly compensated by the growth of trade credit. However, trade credit, by creating

credit chains, may be subject to higher volatility as local shocks get transmitted to the aggregate economy through the credit-chains.

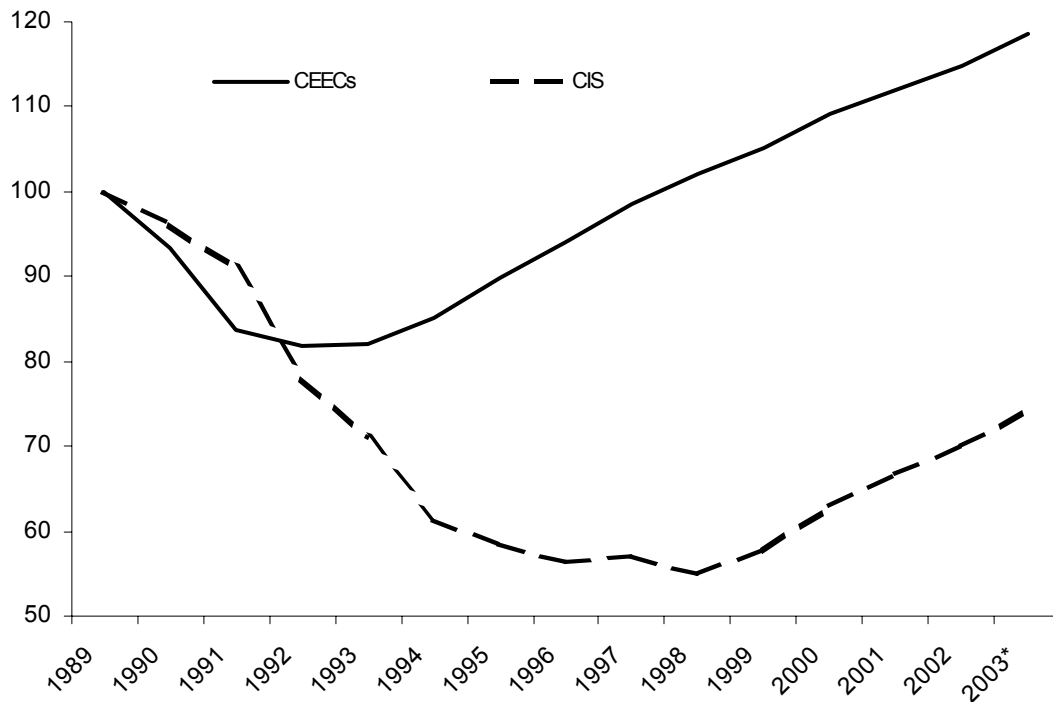
Section 4 provides some evidence on the under-development of credit markets in CEECs. It reports results from cross-country estimates on market economies that indicate that CEECs have credit-to-GDP ratios well below those predicted by such cross-country regressions. Furthermore, we document recent trends indicating rapid growth of real credit and discuss potential risks of “credit booms”, especially in connection with entry of CEECs in the European Monetary Union. Section 5 contains the regression analysis, based on a growth regression and a regression on growth volatility. It is found that the development of credit markets plays a significant role in affecting both growth and volatility. We show that progress in credit market development, through the convergence of the depth and efficiency of credit markets towards the level prevailing in advanced market economies could have a major impact on growth and would sharply reduce output volatility in CEECs. Section 6 concludes with some thoughts on the advantages of a rapid entry in the Euro-zone in terms of a much faster development of financial markets.

## 2. Growth and volatility in CEECs

Figure 1 shows the pattern of behavior of real GDP, contrasting the experience of CEECs with that of CIS countries. Two observations stand out. First, the performance of CEECs has been much better than that of CIS countries. The initial fall in output was much less persistent in CEECs, and it was followed by a continuous recovery, that has brought their level of real GDP some 20 percentage points above the level in 1989. As population has been stagnating over that period, such comparison between levels of real GDP approximates the comparison between GDP per capita. However, a less favorable observation is in order if one compares the performance of CEECs with respect to the countries forming the economic area they are about to join, namely the EU. Indeed, over the same period GDP per capita increased more than by twenty percent in the EU-15. Thus, the almost fourteen years following the launch of market reforms have not yet allowed CEECs to improve their

relative position with respect to EU countries. This implies that convergence in income levels has yet to start.

Figure 1. Real GDP developments in CEECs and CIS countries, 1989=100



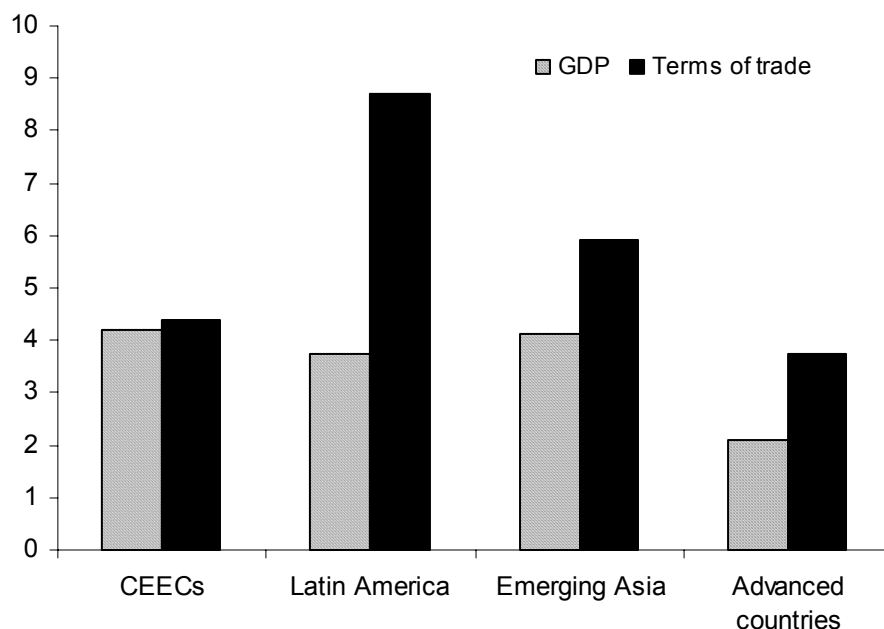
\*Estimates.

Source: EBRD, *Transition Report, various issues*.

Figure 2 contains information on the volatility of GDP growth, excluding the years of initial collapse in output (1990-92), and compares CEECs with emerging markets in Latin America and Asia, and with advanced market economies. The interesting fact is that the volatility of GDP growth in CEECs is twice as large as that of advanced countries, and it is comparable with that of other emerging markets. We also show the volatility of terms of trade during the same period. The main reason is that terms of trade volatility has been singled out as one of the main causes of GDP volatility in emerging markets (see Mendoza (1997)).

Figure 2. Volatility of GDP and of terms of trade,1991-2000\*

(Standard deviation of Real GDP growth and of terms of trade indices)



For CEECs data refer to 1993-2000

Source: IMF, *World Economic Outlook*

Interestingly, volatility of terms of trade in CEECs is much closer to the one characterizing developed rather than emerging economies.<sup>1</sup> Assuming that terms of trade volatility is a decreasing function of diversification in trade and production structure and an increasing function of the differences in the product composition of exports and imports, we can explain the much lower terms of trade volatility for CEECs as resulting from their high degree of trade openness and the large weight of intra-industry trade in their total trade. As intra-industry trade involves trade between goods belonging to the same product category, the behavior of export and import prices should be very similar. These features of CEECs are a reflection of the process of tight integration with the EU countries that is culminating in the entry in the EU.

<sup>1</sup> For a more detailed analysis of sources and effects of volatility in transition countries see Coricelli and Ianchovichina (2004).

In sum, one of the main sources of output volatility identified for emerging economies does not seem to be relevant for CEECs. In the next sections we explore whether under-development of credit markets may account for the high volatility of output in CEECs.

### 3. Underdevelopment of credit markets, institutions and the initial collapse in output

Reforms have proceeded much further in CEECs relative to transition countries of the Former Soviet Union. Accession has been based on fulfillment of the so-called *acquis communautaire*, a set of laws and practices that characterize the institutional framework of the European Union. According to the European Union, completion of all the 31 chapters of the *acquis* is an indication that candidate countries have built the institutional structure for a well-functioning market economy. However, the green light for entry in the EU does not necessarily imply that CEECs have completed their transition in all areas relevant for a market economy. Looking at the indicators of progress in transition constructed by the European Bank for Reconstruction and Development, one notes that there is still a gap between the score for CEECs and the advanced market economy benchmark (Table 1).

A score of 4+ indicates completion of transition. Although on average CEECs display significantly higher scores than countries of the Former Soviet Union, in several areas there is still a significant gap to be eliminated. While transition has been completed in the area of price liberalization and trade and foreign exchange liberalization, transition is not over in the areas of financial market reform, privatization, competition policy and infrastructure reform.

We argue in this paper that such gap in institutional reforms may be one of the main factors behind the slow development of financial markets in CEECs. In addition to the much lower levels of incomes per capita, a low degree of financial depth is perhaps one of main distinguishing features of CEECs when compared with European Union countries (Figure 3).



Such low degree of financial depth cannot be explained by large incomes per capita differentials. Countries involved in previous EU enlargements, like Portugal, Spain and Greece, had income per capita at the time of entry not higher than some of the most advanced CEECs, as Slovenia for instance, but their credit-to-GDP ratios were more than twice as large as those of CEECs.

Table 1. Progress in transition (cumulative indices, 2003)

	Large scale privatization	Small scale privatization	Governance and enterprise restructuring	Price liberalization	Banking reform and interest rate liberalization	Securities markets & non-bank financial institution	Infrastructure
Bulgaria	4-	4-	3-	4+	3+	2+	3-
Czech Rep.	4	4+	3+	4+	4-	3	3
Estonia	4	4+	3+	4	4-	3+	3+
Hungary	4	4+	3+	4+	4	4-	4-
Latvia	3+	4+	3	4+	4-	3	3-
Lithuania	4-	4+	3	4+	3	3	3-
Poland	3+	4+	3+	4+	3+	4-	3+
Romania	3+	4-	2	4+	3-	2	3
Slovakia	4	4+	3	4+	3+	3-	2+
Slovenia	3	4+	3	4	3+	3-	3
Russia	3+	4	2+	4	2	3-	2+
Ukraine	3	4	2-	4	2+	2	2

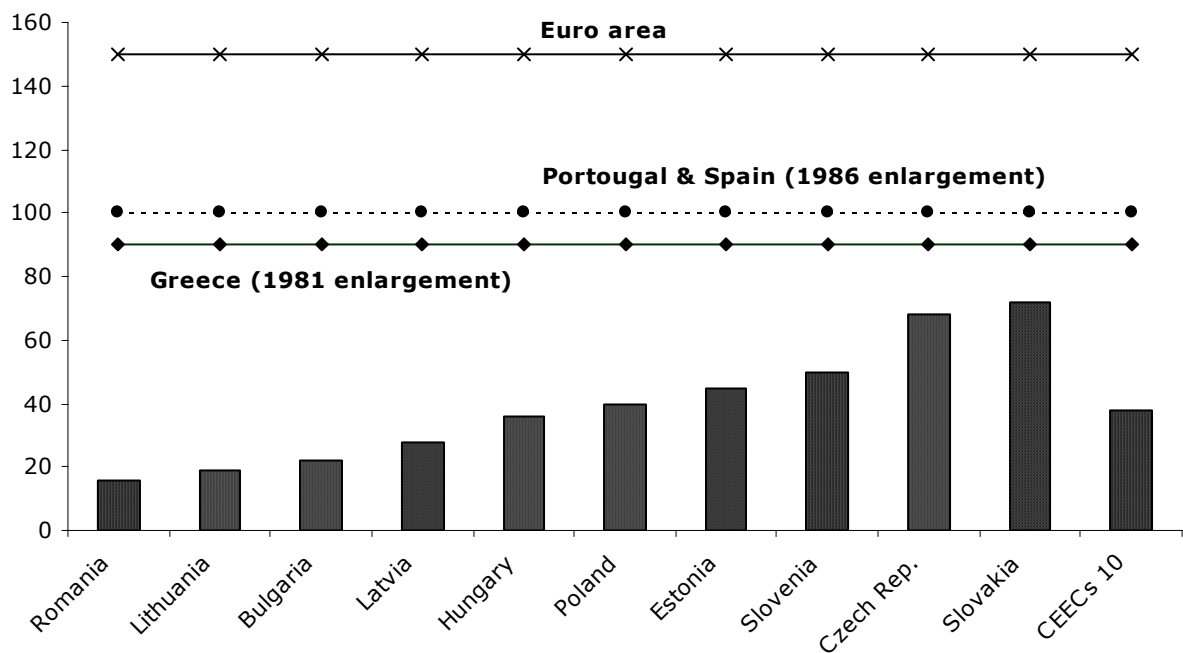
*Source: EBRD Transition Report 2003.*

The reasons for the underdevelopment of financial markets has probably to do with the initial design of liberalization and reform policies and with objective difficulties in developing financial markets in the midst of enormous structural change and transformation of the economy. Partly stimulated by the literature on transition, it is now acknowledged that institutional development plays a key role in macroeconomic performance, both on growth rates and on their volatility (Roland (2000), Acemoglu et al. (2002) among others). One of the main channels through which institutions

affect growth and volatility is that of financial markets. The latter are indeed extremely sensitive to institutional design.<sup>2</sup>

Transition countries offer a unique vantage point for analyzing the role of institutions as they went through a process of radical institutional change, as most institutions necessary for the functioning of a market economy were absent in the previous regime. Liberalization policies left the determination of output to decentralized decisions in a market with free prices. At the same time, firms had to obtain in the market financing for their operations. Financial markets, however, were completely absent in the previous regime and could not be developed instantaneously.

Figure 3. Domestic credit (in % of GDP), 2000



Source: European Central Bank

<sup>2</sup> See for instance EBRD, Transition Report 2003.

Transition countries went through a process that reversed the developments typical for market economies. In the history of capitalism the development of finance preceded the development of industry. Most financial contracts were developed to support the activity of merchants. When the industrial revolution took place, there was financial capital available to sustain the growth of industry. By contrast, planned economies were characterized by very developed industrial systems. Indeed, most planned economies had an excessive weight of industry in the economy. Finance, and money, for the enterprise sector was a “veil”. It did not play any active role. The real equilibrium was determined by planning on real variables and banks served as pure accounting institutions. There was no accumulation of information, skills to assess credit-worthiness. The same concept of credit-worthiness was irrelevant as there was no possibility of bankruptcy. This was the financial sector that most transition countries had when they started their reforms. Whatever the final verdict on what caused the initial collapse in output, it is hard to dispute that there was a fundamental friction in the economy between the possibility of determining a decentralized equilibrium and the total absence of financial markets. Transition countries had to simultaneously develop financial markets and effect an enormous reallocation of resources in the economy.

Following the initial shock, financial markets had to be created, through a combination of policy intervention and spontaneous developments in the economy. Several features of the adjustment process after the initial shock were linked to the essence of finance. In some countries private credit markets developed, through trade credit, in others barter trade became predominant, in others generalized payment default through inter-enterprise arrears emerged. During this second phase, the experience of transition countries was highly heterogeneous. To simplify, CEECs were able to drive through the initial crisis and established a relatively well-functioning market economy.

In the countries of the Former Soviet Union, the output collapse was more persistent, resembling a “bad” equilibrium, a distant relative of a market economy. Whether these two different paths were caused mainly by different macroeconomic policies or by different path of institutional change and by different initial conditions

has been debated. In the review of the debate in Campos and Coricelli (2002), different initial conditions in terms of a minimal structure of market institutions and the subsequent impetus given by the “attraction of Europe” played a crucial role.

In this paper we focus on this subset of countries, in a sense we focus on the “success story”. Nevertheless, we stress that the difficulties in developing financial markets affected also this group of countries and it may explain why growth has been below expectations and volatility of growth much higher than that of European Union countries, despite a remarkable integration of industries of CEECs and EU countries through trade. The focus on CEECs allows us to isolate the role of financial markets and financial sector development in a set of countries that do not differ too much in terms of their policies and that have been affected by the process of accession to the EU.

### 3.1. The initial collapse of output, financial sector development and crisis-volatility

Market reforms implied two simultaneous radical changes. First, banks were supposed to allocate credit at positive real interest rates. Second, inter-enterprise transactions were left to decentralized decisions by firms that had to determine also the conditions for payments of input transactions. Note that firms started their life in a market-based economy without liquid assets, as in the planned regime firms were forbidden to hold cash.

The role of institutional development in transition countries and in particular the role of institutional development for the functioning of financial markets is increasingly stressed in the literature (Roland (2000)).

Let us illustrate the main elements of the Calvo-Coricelli views. In the pre-reform regime, banks recorded enterprise deposits to purchase inputs in the amount decided by the planner. At the same time, there were amounts accredited to the firm for its sale of inputs to other firms. Enterprise deficits were automatically covered by banks. At the aggregate level, banks were covering the net positions of deficit firms. Inter-enterprise transactions were netted out. After reform, all inter-enterprise transactions

took place in a decentralized fashion. Each real transaction required an equivalent cash transfer or a credit position. In order to sustain the same real equilibrium of the pre-reform period, and assuming that firms did not hold any cash reserves at the start of transition, the stock of credit to enterprises should have increased in line with the increase in the price of inputs. It was assumed that firms faced a cash-in-advance constraint for the purchase of inputs.<sup>3</sup> The cash-in-advance constraint for the purchase of non-labor inputs ( $N$ ) can be expressed as follows, with  $C$  denoting cash-flow and  $A$  an unanticipated shock:

$$N \leq \gamma(C(A))_{-1} \quad , \quad \text{with } \gamma \geq 1 \quad (1)$$

When  $\gamma=1$ , the firm has no access to external financing, a condition of extreme credit constraint, that however was not uncommon in several countries in the initial phases of transition (Coricelli (1998)). Assuming a simple production function with intermediate goods ( $N$ ) as only variable input, and labor ( $L$ ) as the fixed factor

$$Q=f(L,\sigma N), \quad \text{with } f'(N)>0 \quad \text{and} \quad f''(N)<0 \quad (2)$$

The parameter  $\sigma$  denotes the importance of intermediate inputs in production. We also assume that payments to factor  $L$  are made at the end of the period and thus do not affect the cash in advance constraint in the current period, although they are important for the accumulation over time of liquidity by firms.<sup>4</sup> In the pre-reform regime, bank credit covered all purchases of inputs. After reforms, input prices change, interest rates are imposed on loans and taxes are raised on enterprise profits. Let us assume that banks keep their loans to enterprises constant in nominal terms. Define  $Q$  as output,  $P$  the price of output,  $B$  bank debt,  $\tau$  enterprise tax rate and  $\Pi$  after-tax profits. We define firm liquidity in real terms (nominal variables deflated by input prices), that is the real liquidity necessary to buy inputs. Furthermore, let us assume that in the pre-reform regime the zero-profit condition holds:  $PQ(N)=P_i N=B$ , or, at relative prices equal to 1,  $Q=B$ .

<sup>3</sup> Rajan and Zingales (1998) use the notion of liquidity needs for firms and sectors.

<sup>4</sup> See Calvo and Coricelli (1992)) for a discussion of the possibility of “borrowing from workers”.

Thus, enterprise liquidity in the new regime is:

$$(B+\Pi)/P_i=(B+(PQ(N)-B)(1-\tau))/P_i \quad (3)$$

We also assume that the firm is viable in the new regime, namely her revenues at full capacity utilization (pre-reform level of output) are sufficient to cover her costs, inclusive of interest payments. It is clear from (3) that at unchanged nominal bank credit the purchase of inputs necessary to produce full-capacity output is affordable only if  $\tau=0$  and relative prices  $P/P_i$  remain equal to one. In such a case (3) implies  $Q=B$ . However,  $\tau>0$  and an adverse shift in relative prices, with input prices increasing more than output prices (adverse supply shock), real liquidity declines and with it input purchases and thus output. Thus, such adverse changes can be thought as bad realization of the shock  $A$ . In such a case constraint (2) is binding and firm's output is liquidity constrained. An implication of the above model is that firms with higher  $\sigma$ , that is firms that are more liquidity-dependent for their production, will display the larger decline in output following a liquidity squeeze. This is indeed what Calvo and Coricelli (1993) found for the case of Poland at the outset of the reforms of the 1990s.

Let us now re-interpret the analysis in terms of the constraint (2). The parameter  $\gamma$  (greater or equal to one) identifies the development of financial markets: the higher is  $\gamma$ , the less dependent firms are on their cash-flow to finance purchase of inputs. It should be noted that in addition to bank credit, other forms of financing such as trade credit, would reduce the dependence of output on cash-flow fluctuations. As discussed below, trade credit could be a substitute for bank credit. However, a large use of trade credit in a system with underdeveloped banking system increases sharply the risk of contagion, the magnification of local shocks to the entire system, and thus is likely to increase output volatility. Here it suffices to say that at the outset of reform in Poland all forms of credit collapsed, including trade credit.<sup>5</sup> When the constraint is binding, it follows that a shocks that reduces the cash-flow of firms induces a higher decrease in output in firms for which working capital has a

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<sup>5</sup> This is shown in Calvo and Coricelli (1993).

greater weight in production. As in the pre-reform regime every purchase of inputs were recorded as debt towards banks, those firms with higher credit for working capital in their output, or better on total costs, were more exposed to the initial shock of reform. Given the lack of external funds other than those from banks, and the policy of restricting credit by banks, the initial situation in a transition economy like Poland in 1990 can be described by a parameter  $\gamma$  close to one. Figure 4 provides some support for this view, showing that the larger output decline occurred in those sectors more dependent on working capital credit for their production.

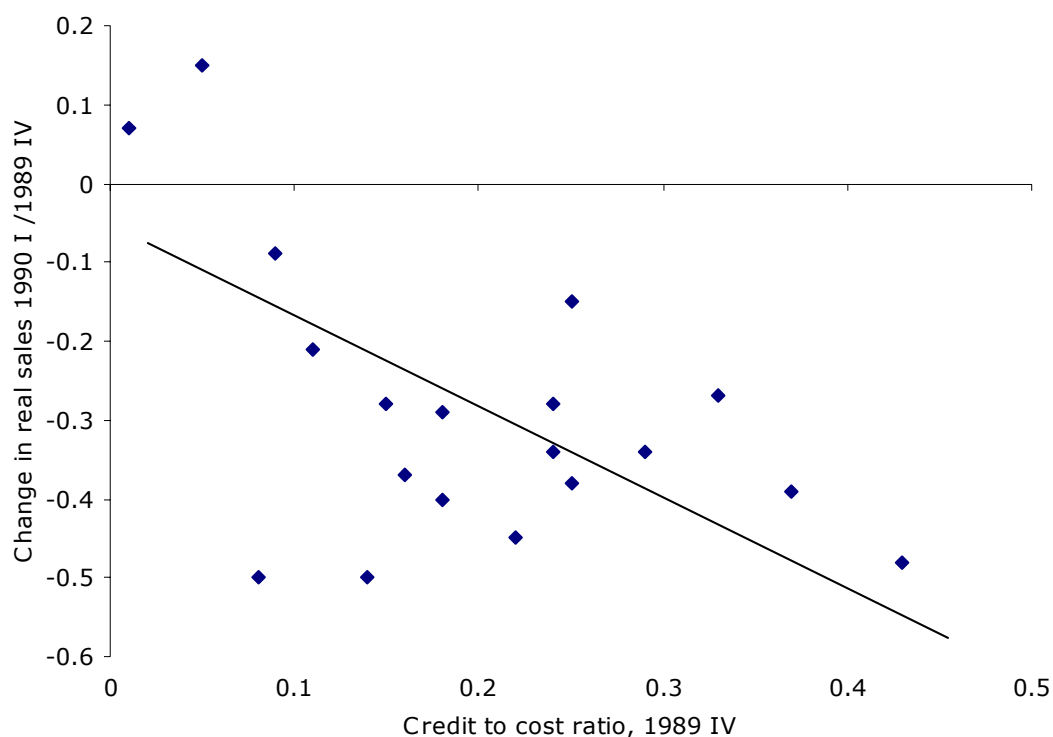
What is special in the experience of transition countries? There are two special features in transition countries: first, the degree of under-development of financial markets was extreme, as credit did not play any role in the planned economy. Second, transition countries are perhaps the only example in which one can identify liquidity needs, without risking to confuse supply and demand for credit.<sup>6</sup>

The paradox is that the equilibrium in the pre-reform period was observationally equivalent to having perfect financial markets. Indeed, output decisions and the distribution of inputs among firms were decided by the planner. Credit played just an accounting role, accommodating real decisions. There was no connection between financial markets and liquidity needs by firms. Decisions at  $t-1$  were not constrained by availability of liquidity. These constraints emerged at  $t$  when a decentralized market system was introduced. With the experiment of unprecedented reforms, economists learnt that the “as if” assumption is not always warranted. Stabilization and reform programs were designed “as if” institutions, property rights, legal systems, ability to process information on credit-worthiness of firms, were already present or nevertheless irrelevant for macroeconomic outcomes.

With the benefit of hindsight, the downplay of the role of financial markets was one of the major drawbacks of stabilization and reform programs in formerly planned economies. We stress this point not for pure intellectual reasons, but because we believe this initial sin conditioned the experience of transition economies and explains some of the persistent problems characterizing even the more advanced among transition countries, namely those about to enter the European Union.

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<sup>6</sup> Rajan and Zingales (1998) discuss the issue and to avoid these problems assume that liquidity needs of a sector are those observed in the US, defined as a benchmark for perfect financial markets.

Figure 4. Credit and output decline, Poland 1990

Source: Calvo and Coricelli (1993)

Of course, we do not want to under-estimate the importance of imposing “hard budget constraints” on enterprises. In the planned economy, incentives were heavily distorted by lack of discipline in the use of resources that can derive by having to repay bank loans. Eliminating automatic accommodation of real decisions was thus a key component of market reforms. However, the difficult task is to create the right incentives but at the same time ensure that liquidity needs for viable and growing firms are available. Combining imposition of right incentives and provision of liquidity is a feature of well developed financial markets and of effective institutional mechanisms for contract enforcement (Coricelli and Djankov (2001)). Indeed, such institutional pre-conditions were a fundamental aspect for the creation of private markets, especially trade credit, that could compensate the slow progress in developing of efficient banking sector.



### 3.2. Trade credit and inter-enterprise arrears

A distinctive feature of successful reformers, namely the CEECs group, in contrast to countries of the Former Soviet Union, is that in the former private credit markets developed rather quickly, while in the latter market liberalization was accompanied by a de-monetization of the economy or the explosion of payment default.

Calvo and Coricelli (1996) developed a simple model of credit chains within a circular system in which each firm is both buyer and seller of inputs, thus potentially both creditor and debtor in the inter-enterprise trade credit market.<sup>7</sup> Here we just illustrate the main mechanism through a simple example.

There are  $n$  firms producing inputs, using labor and inputs from other firms. Assume that trade credit involves a proportion  $\theta$  of input transactions. Each firm exchanges one unit of good. The proportion  $(1 - \theta)$  is the share paid in cash. This cash can be obtained from banks or simply be liquidity accumulated by firms. If the same proportion of trade credit and cash payments is used by every firm,  $(1 - \theta)$  rather than  $(1 - \theta)n$  is the amount of cash needed to support transactions for an amount  $n$  of goods. In the simplest case of identical value of purchases and sales of inputs, each firm has a balanced net position.<sup>8</sup>

Cash is needed only at one point of the chain. However, if we assume that the cash constraint is binding, a contraction of bank credit by  $(1 - \theta)$  induces a decline of sales by  $(1 - \theta)n$ . The same effect would occur if there is a negative shock to the cash-flow of an individual firm that cannot pay anymore her suppliers inducing a chain reaction of reduction in sales.

Consider again the cash-in-advance constraint (1)

$$N \leq \gamma(C(A))_{-1}$$

This now becomes

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<sup>7</sup> See Kiyotaki and Moore (1997) for a model of credit chain.

<sup>8</sup> If we had a model with non-zero net positions, the amount of liquidity needed were equal to the sum of these net positions plus the amount  $(1 - \theta)$ .

$$(1-\theta)N \leq \gamma(C'(A))_1$$

where  $C'(A)$  now takes into account that the cash-flow of a firm is affected by her credit provided to other firms for her sales. In our example of zero net trade credit,  $C(A)-C'(A) = (1-\theta)N$ . Thus, the cash-in-advance constraint remains the same, but it affects a smaller amount of input transactions. The main difference between a situation with trade credit and one without it is that the amount of cash needed to effect transactions would be higher without trade credit. In our scheme, it would be 1, rather than  $\theta$ .

Alternatively, trade credit could replace bank credit, playing *ex post* the same role of the netting out operation carried out by banks in the pre-reform regime. Even though it could be argued that trade credit is a way to overcome informational problems associated to bank credit, it is nevertheless reasonable to assume that trade credit requires a minimum set of institutions ensuring enforcement of private contracts. Lacking these institutions, liquidity shocks induce an equilibrium of generalized default, in the form of inter-enterprise arrears (or involuntary credit). While in the very short run, arrears can reduce output losses, as firms can acquire inputs, such an equilibrium is bound to create large costs. As a result of payment arrears, credit risk becomes so large to impede any transactions based on credit.

Indeed, it is not an accident that following burst in inter-enterprise arrears one observes a boom in barter trade, as it was the case in several FSU countries. In Calvo and Coricelli (1996) it is shown that institutional factors affecting the penalty imposed to bad behavior are key to determine whether the “bad” equilibrium with generalized default takes place.

In the case of the “good” equilibrium, that applies to CEECs, one can note that trade credit was an important factor for financing inter-enterprise transactions. On micro data for Hungary for the mid-1990s, for instance, it was found that many firms completely cut-off from access to bank loans financed their purchases of inputs through trade credit (Coricelli (1998)). As noted above, there is a view that explains trade credit on the basis of informational advantages and on better enforcement of contracts than bank credit. However, this purely microeconomic view downplays a

major drawback of trade credit, that is the bilateral nature of the contracts. Credit positions are not diversified and thus local shocks are transmitted to the whole system. In addition, while direct information on the customer is valuable, the presence of trade credit complicates the analysis of financial positions of firms, and thus of credit-worthiness. A perfectly viable firm can run into liquidity problems if her customer does not pay. As a result the firm cannot pay her supplier. In the bilateral contract the assessment of the capacity to repay of the customer depends on the whole chain. Thus, the information necessary to establish the capability to repay of an individual firm requires a much higher amount of information.

All these factors may imply that a predominance of trade credit with respect to bank credit increases output volatility, by magnifying the aggregate impact of idiosyncratic shocks. However, the Kiyotaki and Moore story and its general equilibrium extension used by Cardoso (2003) to explain higher volatility of output in emerging markets fail to recognize that the credit chain reaction is relevant only when there are large net positions in trade credit. In such an event, problems of cash-poor firms are transferred to cash-rich firms, inducing an inefficient magnifying effect of liquidity shocks to cash-poor firms to the whole system. The more “circular” the system is, the less relevant is this channel. Circularity means that net positions tend to be close to zero. This is indeed the case in most countries, including transition countries. For instance, in Romania, Calvo and Coricelli (1996) found that trade credit was almost perfectly circular, with net debt positions accounting for a marginal fraction of total input transactions. Furthermore, trade credit tends to be a major source of financing of enterprise transactions also in advanced market economies. We argue that the overall development of the financial sector is a fundamental factor in determining whether trade credit is a source of greater volatility.

Consider again the cash-in-advance constraint (1), that would still apply to a model with “circular” trade credit, but let us think at an economy evolving over time. The constraint implies that the higher is the level of development of the financial sector, the higher is  $\gamma$  and the lower are the effects on output of shocks to cash-flow. However, if  $\gamma$  is close to one, cash-flow shocks affect the capability of firms of effecting their cash payments and carrying out production at its full capacity. In such

a situation, it is likely that firms will try to raise their liquidity by reducing the amount of trade credit provided to their customers. In other words, firms will try to get more cash for their sales. If all firms do the same, as the overall amount of cash available in the enterprise sector remains the same, a chain reaction with lower amounts of inputs purchased will emerge, as in the credit-chain foreseen by Kiyotaki and Moore. The ensuing equilibrium is analogous to one of a chain reaction of default. This mechanism is particularly relevant if one takes into account that there are forms of payments, like those to workers or the government that are rather rigid.

Trade credit may account for higher volatility of output in countries with underdeveloped financial markets. Of course, a test of such a conjecture would require an analysis on microeconomic data. Here we simply suggest that the expansion of trade credit in CEECs, as a substitute to bank loans, may be one of the factors explaining the higher volatility of output in these countries relative to EU countries.

Summing up, the economic literature indicates

- (i) An important effect of financial development for economic growth, although it also points out to the difficulty in identifying measures of financial development. Institutions are increasingly identified as essential for a proper functioning of financial markets.
- (ii) An ambiguous relationship between financial depth (credit-to-GDP ratio) and output volatility, as this depends on the source of shocks to the economy. In this regard, we tend to favor the view that the more developed is the financial sector the lower volatility of output should be. After all, the role of financial sector is to smooth shocks to the economy. One of the main arguments is that lacking a developed financial sector, firms tend to finance their activities in ways that increase risk and volatility (credit chains, or self-financing).
- (iii) A corollary of point two is that an inefficient financial sector tends to magnify shocks to the economy. Specifically, shocks to enterprise cash-flow tend to have larger real effects the less developed is the financial sector. The experience of transition countries at the outset of reforms is just an extreme example of this phenomenon.

#### 4. Lagging financial sector during the growth period

During the period following the reforms of the beginning of 1990-91, CEECs experienced major difficulties in developing financial markets. The result is that financial markets remain largely underdeveloped. Recent estimates by the IMF (Cottarelli et al. (2003)) derive “equilibrium” levels for the size of the banking sector, taking into account several indicators explaining the development of the banking sector (Table 2).

Table 2. Actual and predicted value of Credit-to-GDP ratios

	Actual BCPS ratio, 2002	Predicted value	Absolute deviation
Bulgaria	15.6	52.6	-37.0
Czech Republic	42.6	69.3	-26.7
Estonia	46.0	75.4	-29.4
Hungary	29.3	70.5	-41.2
Latvia	24.8	76.7	-51.9
Lithuania	14.2	68.1	-53.9
Poland	28.1	70.4	-42.3
Romania	8.3	58.0	-49.7
Slovak Republic	31.5	59.9	-28.4
Slovenia	38.4	63.8	-25.4

BCPS= bank credit to private sector

Source: Cottarelli et al. (2003)

For CEECs, the gap between predicted and actual credit-to-GDP ratios is extremely large, ranging from 25 to 54 percentage points of GDP. Similar conclusions are reached by Fries and Taci (2002), who emphasize the insufficient effort made by CEECs to spur the development of their financial sector. However, the depth of

financial markets, as summarized by credit-to-GDP ratios is a highly imperfect measure of financial development. Institutional variables are increasingly used as a more significant measure of financial development (Beck et al. (2001)).

Accession to the European Union provides a strong impetus for such institutional change. Indeed, in recent years credit-to-GDP ratios have rapidly increased. Policy-makers in CEECs and the IMF are worried that the adjustment may take place too rapidly, especially in those countries in which domestic financial institutions are still inefficient.

According to many observers (Schadler et al. (2003)), an early adoption of the Euro may sharply increase the risks of an excessive credit expansion. The idea is that the adoption of the Euro will imply a reduction of nominal interest rates to the EU levels and a corresponding decline in real interest rates that will cause a boost to credit. This view overlooks the fact that the adoption of the Euro does not merely represent adoption of a hard peg and the immediate decline of interest rates. Indeed, it represents a major institutional change, with the elimination of currency risks, the elimination of currency mismatches in the balance sheets of banks and the elimination of any risk of monetization of government debt. Of course, adoption of the Euro cannot eliminate the risk of default of local banks. However, national financial sectors will be part of the Euro-zone area and the effects of local problems cannot have systemic effects, given the small size of financial sectors of CEECs. In the context of the Euro-zone, an expansion of credit ratios should not create serious problems. In fact, even inside the Euro-zone it is likely that credit-to-GDP ratios will not increase in countries with inefficient local banks. Open to the external competition of larger and more efficient foreign banks, local banks are likely to quickly go out of business. Although more efficient, large foreign banks will likely concentrate their activities in the retail market and on large corporations, excluding small and medium sized firms that are at the heart of the economic growth in CEECs. Again, increasing efficiency of the financial sector and increasing the supply of loans to small and medium size firms is the key challenge for CEECs. Delaying the adoption of the Euro is likely to exacerbate problems. Indeed, with full capital mobility and maintenance of high domestic interest rates will induce large capital flows that are going to be

intermediated by an inefficient local financial market. Moreover, the typical problems of emerging markets in coping with large and volatile capital flows will apply to CEECs as well.

In the next sections we try to isolate the role of credit in affecting growth and volatility focusing on the subset of transition countries that are entering the EU. Cross-country estimates including countries of the FSU are affected by sharply different economic structures among countries, that would make hard to disentangle the role of credit and financial markets. Accession countries are an interesting sample because they are highly integrated with the EU, through both intra-industry and inter-industry trade. Their industrial structure is highly diversified and their macroeconomic environment relatively stable.

We investigate whether credit markets may be one of the main candidates for understanding why despite all the achievements in reforms and macroeconomic policies, CEECs did not yet display a satisfactory rate of growth and displayed a much higher volatility of output with respect to the European Union. Growth and volatility of output are of paramount importance for the success of the enlargement of the EU. Indeed, a too slow process of “catching up” implies that the income gap between CEECs and EU countries will persist for decades, complicating the management of policies in the EU, oriented towards a unified framework for both monetary and fiscal policies. Furthermore, higher volatility implies that CEECs will find difficult to respect EU fiscal rules, designed for countries having much lower output volatility. Finally, persistence of large asymmetries in the development of financial markets may cause instability in CEECs in a context of free capital mobility in a period when they retain their own currency, and it may create inefficient transmission of the single monetary policy when they will enter the Euro-zone.

##### 5. Credit, institutions, growth and volatility

We carried out the analysis on quarterly data over the period 1993-2003. The sample includes only 9 countries as quarterly data are not available for Romania. First, we estimate a Barro-type growth regression, augmented by the inclusion of financial

variables. Second, we explore empirically the effects of indicators of credit sector development on GDP growth volatility.

### 5.1. Estimation methodology

We employ the GMM estimation procedure to address the endogeneity problem between GDP growth and all explanatory variables that are not of institutional nature, i.e. share of government expenditure in GDP, interest rate spread and growth in real credit to private sector. The instruments are chosen from the set of lagged endogenous and explanatory variables and a set of initial conditions (a detailed list of instruments is given in the tables) (Baltagi, 1995). The validity of instruments that give a set of over-identifying restrictions has been verified with the standard Sargan test, that confirms that in all cases our set of instruments is valid. The standard errors of coefficients are robust to heteroscedasticity. Correct statistical specification of the models has been additionally checked by the test for presence of first and second order residual autocorrelation. For all models presented below the test confirm the absence of residual autocorrelation.

The specification of estimation equations is dynamic. From a fairly general initial model including four lags of endogenous and explanatory variables the final model was selected following general to specific modeling approach. Time-invariant cross-section-specific effects in the GDP growth equation were accounted for by including a set of initial conditions: initial EBRD transition index of banking reform and interest rate liberalization (BR&IRL\_0), initial GDP per capita at PPP values (GDPpc\_0), initial credit to GDP ratio (CR/GDP\_0), interaction terms between BR&IRL\_0 and GDPpc\_0 BR&IRL and CR/GDP\_0, and finally, a dummy variable for the group of Baltic countries (Estonia, Latvia and Lithuania). All initial conditions are evaluated at the beginning of the data sample available for each country. As it turned out, only the dummy for Baltic countries resulted to be significant in the final specification of the model of the growth equation (with time-varying effect of BR&IRL). As a robustness check we estimated the same equation also by considering fixed effects as generic initial conditions. The same has been done in the GDP growth



volatility equation. There it also resulted that initial conditions variables do not statistically significantly explain the GDP growth variability. For generality we nevertheless accounted for fixed effects.

## 5.2. The growth regression

We include three indicators of financial development. One is the traditional indicator used by King and Levine classic paper (1993), the credit to non-government sector to GDP. The other two are indicators of efficiency of the financial sector: the spread of lending versus deposit rate and the index of institutional development constructed by the EBRD, that measures the progress in reform of the financial sector. Table 3 contains results of the analysis on growth rates. Results indicate a significant role of all financial indicators.

Indicators of efficiency of the financial sector, both the interest rate spread and the institutional variable, appear highly significant. Contrary to findings in King and Levine, the initial credit-to-GDP ratio is not significant. We include the rate of change of real credit as explanatory variable, with its coefficient interacted also with the index of financial sector development. The interesting result is that real credit growth has a positive effect on output growth only when financial sector development has passed a threshold, due to combined effect of the CRg term and its interaction with BR&IRL. Above that threshold, the growth process is positively affected by credit growth. This seems consistent with the view on the importance of the efficiency of financial sector in countries in which growth is determined by large reallocation of resources across firms and sectors.

On the basis of our results we can carry out an experiment on the impact on growth of an improvement in the financial sector of CEECs. The first hypothetical change we consider is the completion of financial reform that will bring CEECs to reaching the value for the institutional indicator assumed for EU countries, i.e. the average values of BR&IRL indicator in 2003 of 3.44 is increased to 4. The second change is a 2.4 percentage point reduction in the spread between lending and deposit

rates to typical EU countries' levels (assuming average real credit growth at the same level as in 2002/03).<sup>9</sup>

Table 3. GDP growth equation

	<b>Coefficient</b>	<b>Std. Err.</b>	<b>p-value</b>	<b>Long-run</b>	<b>Std. Err.</b>
<b>GDPg(-1)</b>	0.489	0.106	0.00		
<b>GDPg(-2)</b>	0.105	0.032	0.00		
<b>GDPg(-4)</b>	-0.177	0.051	0.00		
<b>GovEx/GDP</b>	0.078	0.014	0.00	0.134	0.037
<b><math>i_L-i_D</math></b>	-0.168	0.017	0.00	-0.289	0.044
<b>BR&amp;IRL</b>	0.352	0.180	0.05	0.603	0.204
<b>CRg(-1)</b>	-0.108	0.024	0.00	-0.185	0.051
<b>CRg* BR&amp;IRL (-1)</b>	0.049	0.011	0.00	0.085	0.020
<b>Bal</b>	1.007	0.340	0.00	1.727	0.635
No. of obs	265	N =9	$T_{min}=22$	$T_{max}=34$	
Sargan test	$\chi^2(399) = 256.0$ p-val=1.00				
AR(1) test	N(0,1)=0.40 p-val = 0.69				
AR(2) test	N(0,1)=1.25 p-val = 0.21				
Instruments	GDPg(-5), GDPg(-6), GovEx/GDP(-5), GovEx/GDP(-6), $i_L-i_D(-5)$ $i_L-i_D(-6)$ , CRg(-5), CRg(-6), Initial GDPpcPPP, Initial Rule-of-Law, Initial BR&IRL index, Initial SM&NB index				

Notes: GMM estimation using robust standard errors. Dependent variable: real GDP growth over the previous year. Variables' mnemonics: GDPg – real GDP growth, GovEx/GDP – share of government expenditure in GDP, seasonally adjusted,  $i_L-i_D$  – spread between lending and deposit interest rates, CRg – growth in real credit to private sector, Bal – dummy for Baltic countries (Estonia, Latvia and Lithuania), GDPpcPPP – initial GDP per capita at PPP, BR&IRL – EBRD transition indicator of banking reform & interest rate liberalisation, SM&NB - EBRD transition indicator of securities markets and non-bank financial institutions, Rule-of Law - EBRD transition indicator on strength of general legal institutional framework. Data sources: EBRD Transition report, IMF International Financial Statistics, OECD Main Economic Indicators. Longest sample: 1993:1 – 2003:2

The combined effect of these two changes would raise the average long-run rate of GDP growth by 1.4% percentage points or by nearly 1/3 (from 4.74% to 6.13%). Consequently, the process of real convergence to EU income per capita levels would be significantly faster.

<sup>9</sup> Average interest rate spread in the countries under analysis in 2002/3 was 4.14 percentage points. The spread for the Euro area has been calculated as the spread between the interest rate for loans to non-financial institutions with maturity up to 1 year and deposit rates for non-financial institutions with maturity up to 2 years in 2003 (data taken from ECB Monthly Bulletin).

### 5.3. GDP growth volatility regression

Several cross-country studies have found that volatility is a nonlinear function of the depth of the banking sector. Volatility is adversely affected by financial development for intermediate systems, that are likely to be associated to countries at their early stages of financial liberalization. Beck et al. (2001), extending the model by Bacchetta and Caminal (2000), argue that the relationship depends on the source of shocks to the economy. Real shocks are dampened by developed financial sectors, while monetary shocks are not. The intuition is that a monetary-credit shock induces a larger reaction of the real side of the economy if the depth of the financial sector is higher.

The empirical observation of a positive correlation between volatility and size of the financial sector is an indirect evidence of a predominance of monetary shocks in the sample considered by the above study. However, this result can be linked to the fact that in emerging economies volatility is not only a “regular” phenomenon of deviations from trend, but it is dominated by punctuated crisis events. These crises tend to be both currency and financial crises. The impact of such crises on output is likely to be higher the larger is the financial sector. In the CEECs group such interpretation can be applied to the experience of the Czech Republic and Bulgaria in 1997, as in both cases there was a financial crisis that lead to a sharp decline in output and a subsequent reduction of the depth of the financial sector. However, there is an alternative channel that implies a negative correlation between volatility of output growth and financial development, that has to do with the characteristics of the growth process of transition countries.

Think for simplicity at a two sector growth model, with one “dynamic” sector and one less efficient, stagnating sector. Aggregate growth is the result of the asymmetric behavior of the two sectors. With an efficient financial sector resources are quickly allocated towards the more dynamic sector that quickly replaces the old sector, yielding a growing economy from the start. With large imperfections in the financial sector such a process is slowed down and initially the decline in old sectors is not compensated by the growth of new sectors. As in the model of Chadha and Coricelli

(1997) growth follows a U-shaped pattern. Over the time span of such inverted “U”, one would measure a high volatility of output growth, higher than the case of an upward trend, that will emerge with perfect capital financial markets. Moreover, if one considers an extreme situation of credit market imperfections, one in which firms have no access to borrowing and thus finance through accumulation of money holdings their activities, any shock to cash-flow will affect output. Inflation, for instance, will not be neutral, as is the case with money in the production function, that is a case analogous to one in which there is no access to external borrowing and a cash-in-advance constraint in the purchase of inputs. In such a case, inflation would reduce the real purchasing power in terms of inputs of the stock of monetary holdings that firms carry over from the previous period.

Finally, consider the case in which inter-enterprise transactions are financed mainly via trade credit, with little possibility of obtaining liquidity in many parts of the chain. Any shock that creates a shortage of liquidity for an individual firm gets transmitted through the chain of credit, with a ballooning effect on total production. Therefore, departures from well-functioning credit markets are likely to increase output volatility, because of an inefficient allocation of resources and because of an exaggerated sensitivity of output to cash-flows of individual firms, similarly to the literature on investment and financial constraints.

Table 4 contains the results of the regression analysis relating financial sector development and volatility of output growth. We consider the same variables used in the growth regression.

In the case of volatility of growth, the two financial sector development variables that appear significant are the interest rate spreads and the interaction between the initial credit-to-GDP ratio and the index of financial sector development.

Volatility in policy variables, both fiscal and monetary affect output volatility. Even controlling for these effects, and accounting for fixed effects, the efficiency and development of the financial sector play a crucial role.

Table 4. GDP growth volatility equation

	<b>Coeff.</b>	<b>Std. Err.</b>	<b>p-value</b>	<b>Coeff.</b>	<b>Std. Err.</b>	<b>p-value</b>
<b>Stddev(GDPg)(-1)</b>	0.620	0.025	0.00	0.618	0.023	0.00
<b><math>i_L-i_D(-4)</math></b>	0.050	0.005	0.00	0.050	0.005	0.00
<b>Stddev(GovEx/GDP)</b>	0.549	0.275	0.05	0.553	0.275	0.04
<b>stddev(GovEx/GDP)(-4)</b>	-0.328	0.199	0.10	-0.339	0.195	0.08
<b>Stddev(CRg)(-2)</b>	0.030	0.005	0.00	0.029	0.006	0.00
<b>Stddev(CRg)(-3)</b>	-0.039	0.008	0.00	-0.039	0.008	0.00
<b>Stddev(CRg)(-4)</b>	0.016	0.007	0.02	0.015	0.008	0.04
<b>CR/GDP_0* BR&amp;IRL</b>	-0.017	0.004	0.00	-0.014	0.005	0.01
<b>BR&amp;IRL</b>	0.163	0.269	0.54			
No. of obs	245	N =9	$T_{\min}=21$	$T_{\max}=32$		
Sargan test	$\chi^2(215) = 203.4$ p-val=0.70			$\chi^2(216) = 204.5$ p-val=0.70		
AR(1) test	N(0,1)=0.83 p-val = 0.41			N(0,1)=0.88 p-val = 0.38		
AR(2) test	N(0,1)=-1.55 p-val = 0.12			N(0,1)=-1.50 p-val = 0.13		
Instruments	stddev(GDPg)(-5), stddev(GDPg)(-6), stddev(GovEx/GDP)(-5), stddev(GovEx/GDP)(-6), stddev(CRg)(-5), stddev(CRg)(-6), Initial GDPpcPPP					

Notes: GMM estimation using robust standard errors. Dependent variable: standard deviation of real GDP growth over the previous year. Variable mnemonics: stddev(GDPg) – standard deviation of real GDP growth, stddev(GovEx/GDP) – standard deviation share of seasonally adjusted government expenditure in GDP,  $i_L-i_D$  – spread between lending and deposit interest rates, stddev(CRg) – standard deviation of real credit growth, BR&IRL – EBRD transition indicator of banking reform & interest rate liberalisation, CR/GDP\_0\* BR&IRL – interaction between initial share of credit in GDP and BR&IRL, GDPpcPPP – initial GDP per capita at PPP

We perform the same experiment done for the case of output growth, by computing the impact on volatility for the same two types of improvement in financial market conditions (increase in BR&IRL index and reduction in interest rate spread). In addition, the credit-to-GDP ration is increased from an average value of 27% at the beginning of the estimation period to the average “equilibrium” level estimated by the IMF study discussed above (66.5%). A simultaneous improvement in all areas of financial development considered would sharply reduce output volatility, by  $\frac{1}{4}$ , bringing it closer to that observed for the average of EU countries.

## 6. Conclusions

Credit markets play a crucial role in the transformation of CEECs from centrally-planned to market economies. Our, albeit preliminary, empirical analysis finds support on the important role of financial sector development for both the rate of output growth and for its volatility. Not only the depth of credit markets, but also its efficiency and the overall level of development of financial markets appear central to the growth process of CEECs. Furthermore, the process of financial sector development crucially hinges on institutional building. CEECs have a great opportunity for strengthening their institution by joining the European Union and, perhaps even more important, the Euro-zone. Contrary to the traditional OCA theory, countries with large structural asymmetries with respect to the Euro-zone countries (for instance with lower GDP per capita) and with still undeveloped financial markets can benefit significantly from joining the Euro-zone. Joining a currency union may lead to large benefits in terms of diversification of risk and access to smoothing instruments. Often, empirical analysis measures the readiness to join a monetary union in terms of structural asymmetries, measuring overall volatility of output, and the correlation between individual country shocks and those of the currency area he is going to join. These analyses neglect the importance of transmission of shocks through the financial sector. If the financial sector of a union is more efficient than the national one, joining the union reduces the transmission of nominal shocks to output, or for that matter, the transmission of temporary shocks to output, whatever their origin.

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